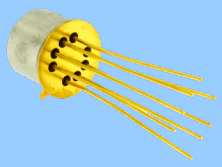
TELEDYNE RELAYS
A Teledyne Technologies Company

Series RF312

DPDT Non-Latching Electromechanical Relay
Signal Integrity up to 20Gbps

HIGH REPEATABILITY, DC-8 GHz/20Gbps TO-5 RELAYS, DPDT



SERIES	RELAY TYPE
RF312	DPDT Non-latching, Repeatable, RF relay

DESCRIPTION

The ultra miniature RF312 is designed to improve upon the RF300 relay's high frequency performance. The RF312 offers monotonic insertion loss to 8 GHz. This improvement in RF insertion loss over the frequency range, makes these relays highly suitable for use in attenuator and other RF circuits.

The RF312 features:
- High repeatability.
- Broader bandwidth.
- Metal enclosure for EMI shielding.
- Ground pin option to improve case grounding.
- High isolation between control and signal paths.
- Highly resistant to ESD.

CONSTRUCTION FEATURES

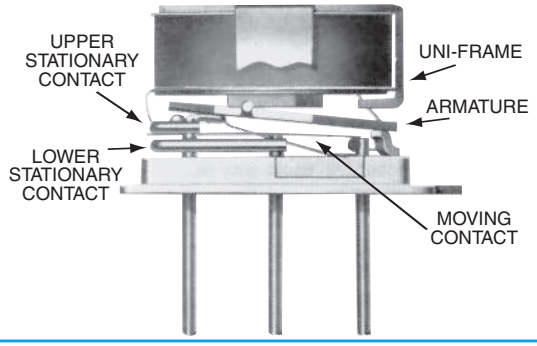
The following unique construction features and manufacturing techniques provide excellent resistance to environmental extremes and overall reliability.

- Uni-frame motor design provides high magnetic efficiency and mechanical rigidity.
- Minimum mass components and welded construction provide maximum resistance to shock and vibration.
- Advanced cleaning techniques provide maximum assurance of internal cleanliness.
- Gold-plated precious metal alloy contacts ensure reliable switching and signal fidelity.
- Hermetically sealed.
- Solder-Dipped Leads, (RoHS compliant solder option available)

ENVIRONMENTAL AND PHYSICAL SPECIFICATIONS

Temperature (Ambient)	**Storage**	–65°C to +125°C
	Operating	–55°C to +85°C
Vibration (Note 1)		10 g's to 500 Hz
Shock (Note 1)		30 g's, 6ms half sine
Enclosure		Hermetically sealed
Weight		0.09 oz. (2.55g) max.

INTERNAL CONSTRUCTION



GENERAL ELECTRICAL SPECIFICATIONS (-65°C to +125°C unless otherwise noted)(Notes 2 & 3)

Contact Arrangement	2 Form C (DPDT)
Rated Duty	Continuous
Contact Resistance	0.15 Ω max.
Contact Load Rating	Resistive: 1Amp/28Vdc Low level: 10 to 50 µA @ 10 to 50 mV
Contact Life Ratings	1,000,000 cycles (typical) at low level contact load
Coil Operating Power	RF312: 450 mW typical at nominal rated voltage
Operate Time	RF312: 4.0 ms max.
Release Time	3.0 ms max.
Intercontact Capacitance	0.4 pf typical
Insulation Resistance	1,000 MΩ min. between mutually isolated terminals
Dielectric Strength	350 Vrms (60 Hz) @ atmospheric pressure

DETAILED ELECTRICAL SPECIFICATIONS (-65°C to +125°C unless otherwise noted)(Note 3)

BASE PART NUMBERS (RF312)	RF312-5	RF312-12
Coil Voltage, Nominal (Vdc)	5.0	12.0
Coil Resistance (Ohms ±20%)	50	390
Pick-up Voltage (Vdc max.)	3.6	9.0

Part Numbering System (Notes 4 & 5)

RF312 YZ - 5 / S R

Relay Series
RF312

Ground Pin Option
(See Appendix A)

Coil Voltage
5 = 5V
12 = 12V

Lead Length
S = 0.187" Leads
No Suffix = 0.75" Leads

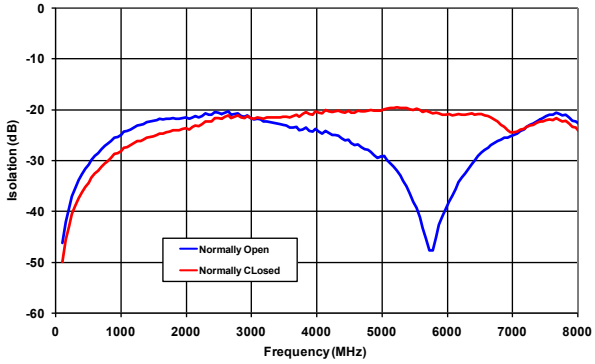
Lead Finish
Q = Solder-Coated Leads (Sn60/Pb40)
R = RoHS Compliant Solder (Sn99.3/Cu0.7)
No Suffix = Gold-plated Leads

NOTES

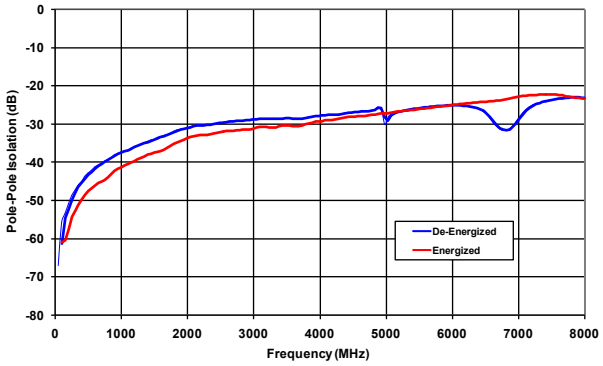
1. Relays will exhibit no contact chatter in excess of 10 µs or transfer in excess of 1 µs.
2. "Typical" characteristics are based on available data and are best estimates. No on-going verification tests are performed.
3. Unless otherwise specified, parameters are initial values.
4. The slash and characters appearing after the slash are not marked on the relay.
5. Unless otherwise specified, relays will be supplied with gold-plated leads.

TYPICAL RF CHARACTERISTICS (See RF Notes)

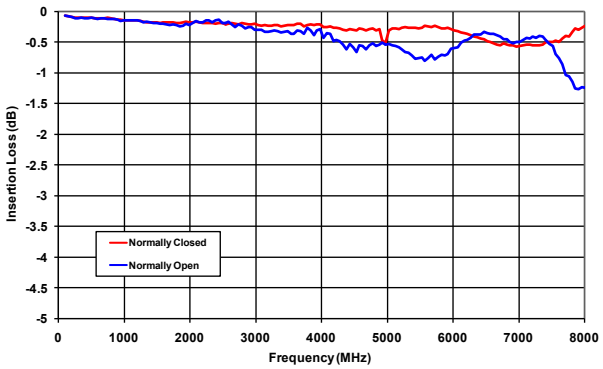
Isolation Across Contacts (RF Note 4)



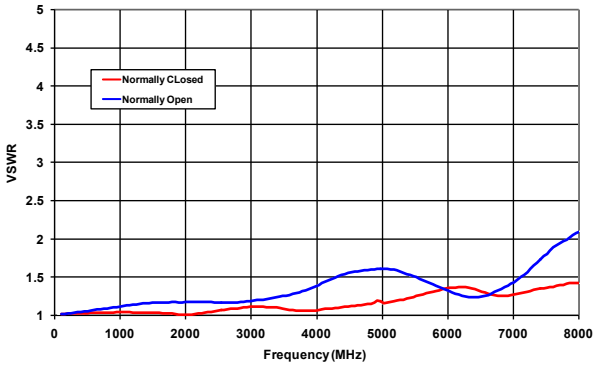
Isolation Pole to Pole (RF Note 5)



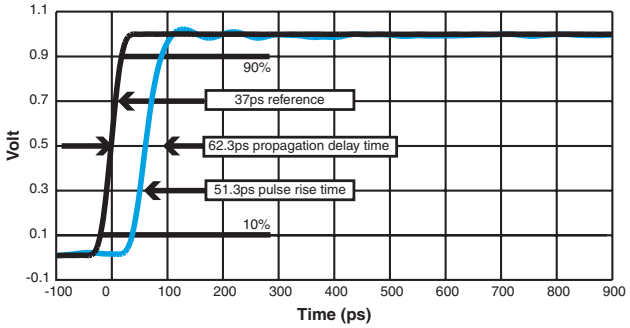
Insertion Loss (RF Note 6)



VSWR (RF Note 6)



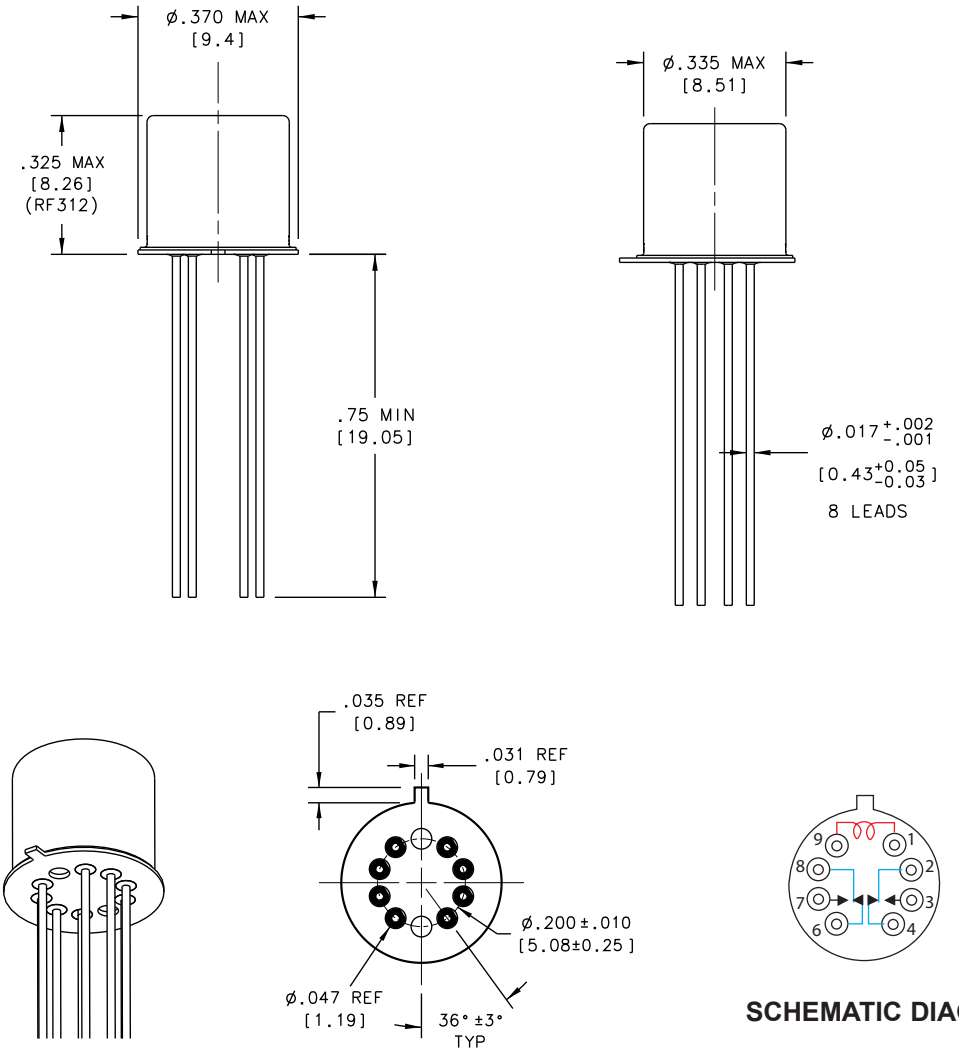
RF312 Time Response (RF Note 6)



RF NOTES

1. Test conditions:
   - *a.* Fixture: .031" copper clad, reinforced PTFE, RT/duroid® 6002 with SMA connectors. (RT/duroid® is a registered trademark of Rogers Corporation.)
   - *b.* Room ambient temperature.
   - *c.* Terminals not tested were terminated with 50-ohm load.
   - *d.* Contact signal level: –10 dBm.
   - *e.* No. of test samples: 4.
2. Data presented herein represents typical characteristics and is not intended for use as specification limits.
3. Data is per pole, except for pole-to-pole data.
4. Data is the average from readings taken on all open contacts.
5. Data is the average from readings taken on poles with coil energized and de-energized.
6. Data is the average from readings taken on all closed contacts.
7. Test fixture effect de-embedded from frequency and time response data.

OUTLINE DIMENSIONS

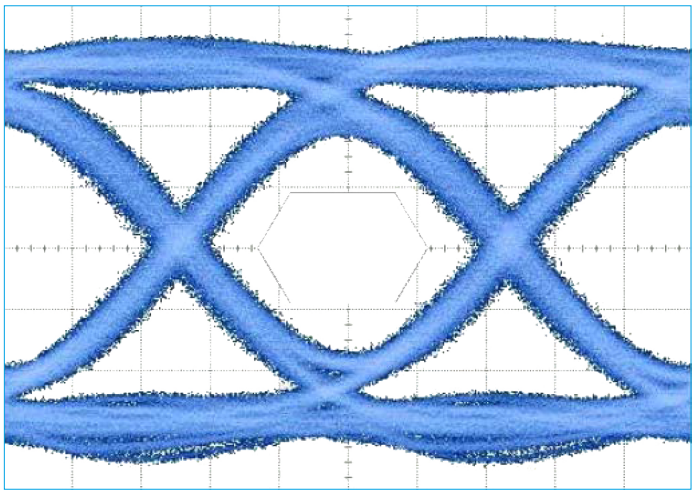


SCHEMATIC DIAGRAM

NOTES:

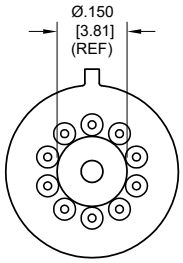
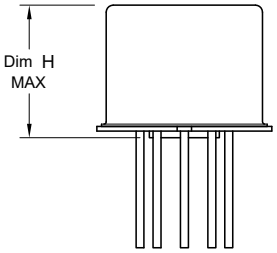
1. **DIMENSIONS ARE IN INCHES, METRIC EQUIVALENTS SHOWN IN [ ].**
2. **POSTITIONS 5 AND 10 ARE FOR UNINSULATED CASE GROUND OPTIONS.**
3. **NO PROTRUSION BELOW BOTTOM OF HEADER WHEN GROUND PINS ARE INSTALLED**
4. **TO ORDER THE CASE GROUND OPTION, AFTER THE SERIES DESIGNATOR, ADD "Y" TO THE PART NUMBER FOR POSITION 5 OR "Z" TO THE PART NUMBER FOR POSITION 10.**

TYPICAL Single-Ended Signal Integrity Characteristics @ 20 Gbps



Bit Rate	Eye Height	Eye Width	$Jitter_{P-P}$
20 Gbps	191 mV	37 ps	10.22 ps

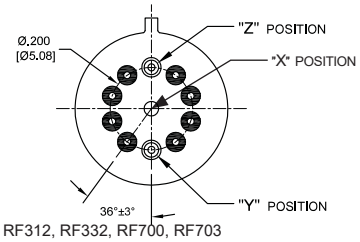
APPENDIX A : Spacer Pads

Pad designation and bottom view dimensions	Height	For use with the following:	Dim. H Max.
		RF312	.350 (8.89)

Notes:

1. Spacer pad material: Polyester film.
2. To specify an “M4” spacer pad, refer to the mounting variants portion of the part numbering example in the applicable datasheet.
3. Dimensions are in inches (mm).
4. Unless otherwise specified, tolerance is ± .010” (.25 mm).
5. Add 10 mΩ to the contact resistance shown in the datasheet.
6. Add 0.01 oz. (0.25 g) to the weight of the relay assembly shown in the datasheet.

APPENDIX A : Ground Pin Positions



RF312, RF332, RF700, RF703

ER412, ER4121, ER422, ER432, ER4321, 712, 712TN, 400H, 400K, 400V, RF300, RF303, RF312, RF332, RF310, RF313, RF320, RF323, SI800, SI803, RF700, RF703

○ Indicates ground pin position

● Indicates glass insulated lead position

◎ Indicates ground pin or lead position depending on relay type

NOTES

1. Terminal views shown
2. Dimensions are in inches (mm)
3. Tolerances: ± .010 (±.25) unless otherwise specified
4. Ground pin positions are within .015 (0.38) dia. of true position
5. Ground pin head dia., 0.035 (0.89) ref: height 0.010 (0.25) ref.
6. Lead dia. 0.017 (0.43) nom.
7. “X” and “Z” Positions are not applicable for JAN Relays